

***Boguea panwaensis*, a new species from Thailand: the first member of the Bogueinae (Polychaeta: Maldanidae) to be found outside northeast America**

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*Abstract.*—A new boguein polychaete species, *Boguea panwaensis*, is described from Cape Panwa, Phuket, Thailand. It is closely related to the North American *B. enigmatica*, but differs in number, arrangement and structural details of its chaetae.

The first species of the maldanid subfamily Bogueinae was described from Bogue Sound, North Carolina, by Hartman (1945), who first considered it as belonging to the Oweniidae. Later on (Wolf 1984) it was recorded from different localities around the coasts of North America at depths down to 100 m, usually between 2 and 20 m, in sand and sand-gravel. With the description of the closely related species *Boguella ornata* Hartman & Fauchald, 1971, the two authors erected the family Bogueidae and mentioned that it differs from oweniids in possessing avicular or terebelloid uncini (Hartman & Fauchald 1971). Wolf (1983) redescribed the taxon and reduced its rank to Bogueinae, a subfamily of the Maldanidae, emphasising that they share morphological and ontogenetic features especially characteristic of this family. Independently of Wolf (1983), Nilsen and Holthe (1985) argued in the same direction by stating that the boguein uncini could well be derived from those of the Rhodininae, a subfamily of the Maldanidae. Holthe (1986) confirmed this in his phylogenetic discussion of the Bogueidae. The new *Boguea* species presented is the first one occurring outside the North American area.

*Boguea panwaensis*, new species

Figs. 1, 2, 3 A–F, 4 A–E

*Material examined.*—Two complete specimens and one anterior end with 5

chaetigers. Location: Thailand, Phuket, Cape Panwa, near the Phuket Marine Biological Center (PMBC), at a depth of about 10–15 m in the centre of the bay west of the aquarium (7°52'N, 98°22'E); mature specimen and anterior end found in October 1994, immature specimen in March 1995. Probably living in a layer (1–3 cm) of very fine, mostly oozy organic material on top of fine sand with organic material, few shells and little gravel, partly with clay texture.

*Methods.*—Extraction of the polychaetes was carried out with a solution of 8% MgCl<sub>2</sub> isotonic to sea water. Specimens were observed in living condition before they were fixed in Bouin's fluid, and then transferred to 70% ethanol. For SEM investigations the dehydrated specimens were critical-point dried with CO<sub>2</sub> as intermedium, mounted with a carbon film on aluminium stubs, sputter-coated with gold and examined in a Zeiss 962 SEM.

*Type material.*—Holotype with 24 chaetigers (length 10 mm), mature; deposited in the Phuket Marine Biological Center, Reference Collection, Thailand (No. PMBC 13577). Paratype with 23 chaetigers (length 4 mm), immature; SEM preparation, deposited in the collection of the Senckenberg Museum, Frankfurt (No. SMF 5633).

The new species was named after Cape Panwa in the southern region of the island

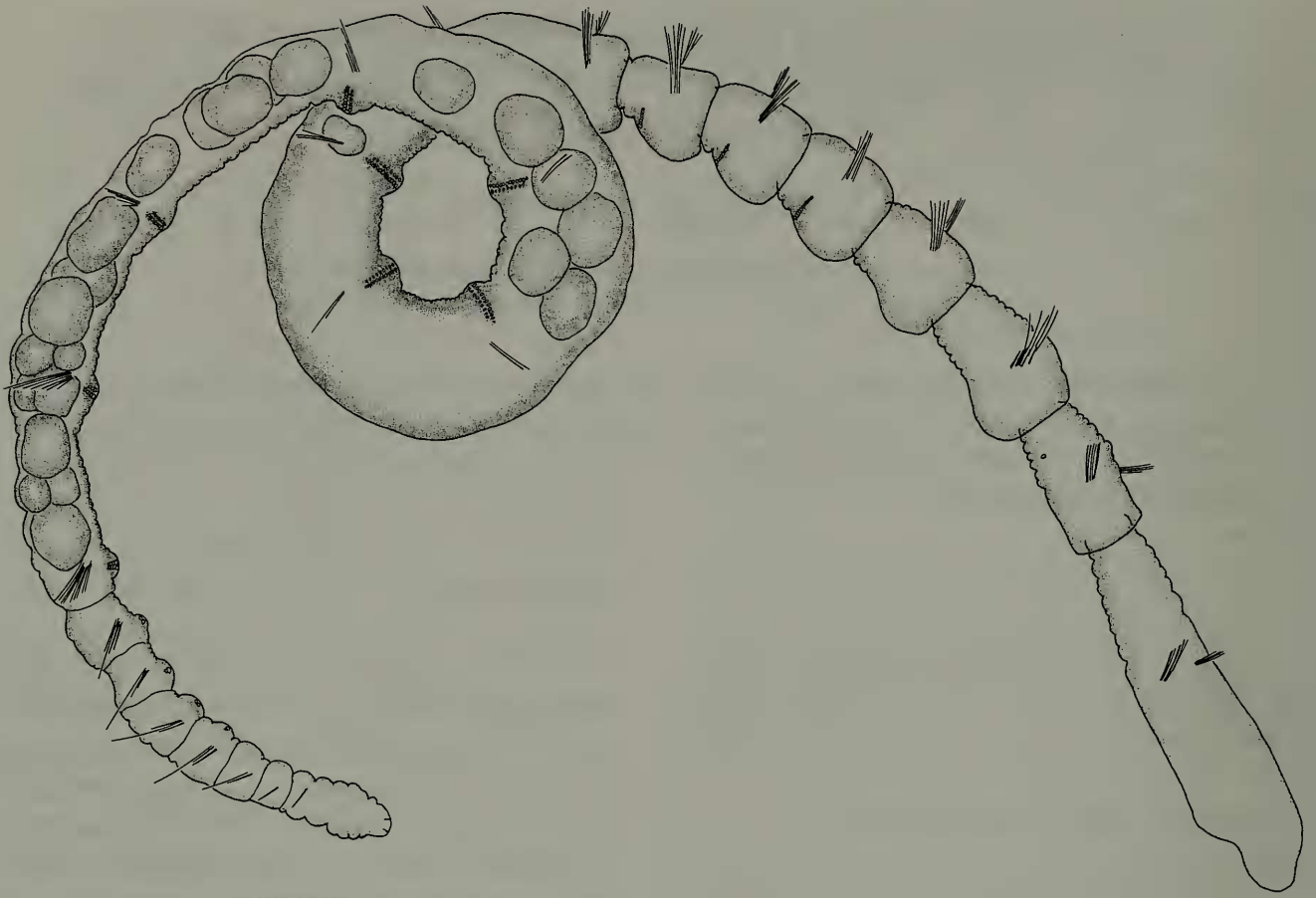


Fig. 1. *Boguea panwaensis*, new species. Holotype with oocytes, lateral view (on chaetiger 2 a single juvenile uncinus). Scale bar = 1 mm.

of Phuket, where it was found by the authors.

*Material for comparison.*—*Boguea enigmatica* Hartman, 1945 (extracted from: ZMUC-POL-541; Bogue Sound, North Carolina 6 Aug. 1962).

*Description.*—Length about 10 mm, up to 24 chaetigerous segments, width about 0.5 mm. Colour light brownish-translucent. Body divided into three regions differentiated by the shape of the segments and the distinctness of their boundaries, type and number of notochaetae, number of uncini and their arrangement in one or two rows. Prostomium, peristomium and pygidium without appendages.

*Anterior region.*—Through chaetiger 7. Prostomium and peristomium fused. Prostomium anteriorly rounded. No nuchal organs visible. Borderline between peristomium and first chaetiger indistinct. Chaetigers 2 to 7 contractible, so that their anterior

part may be wider than their posterior part (Fig. 1) and the preceding chaetiger is partly recessed into the following one. When relaxed, chaetigers longer than wide. Parapodia absent, except groups of notopodial and neuropodial chaetae, emerging in the middle of each chaetiger, and arranged in one or two rows. Types of notopodial chaetae in this region include simple, smooth capillaries, serrated capillaries and short, stiff spines. In chaetiger 3 four serrated capillary chaetae with minute imbrications and one smaller additional capillary. In the following chaetigers only some of the capillaries show this special structure (Table 1). In chaetiger 3 one additional row of four short spines anterior to these capillaries.

Neuropodial chaetae may be present from chaetiger 2 backwards. One small rostrate uncinus in chaetigers 2 to 4 (Fig. 3D, E) in the juvenile specimen (Fig. 2). In the mature specimen (Fig. 1) the latter are miss-

Table 1.—Distribution of types of notopodial chaetae in the holotype of *Boguea panwaensis*, new species.

Chaetiger	Types of chaetae on the notopodia
1–2	smooth capillary chaetae
3	stiff, short spines; serrated capillary chaetae
4–7	serrated and smooth capillary chaetae
8–13	imbricated capillary chaetae
14–17	serrated capillary chaetae; capillary chaetae with triangular imbrications; slightly curved, flattened serrated chaetae
18–22	short spines; smooth capillary chaetae
23–24	short spines

ing, with the exception of one in chaetiger 2. The neuropodial chaetation commences in chaetiger 5, consisting of a single row of avicular uncini in chaetigers 5 to 7, their number varying between 7 and 12.

*Middle region.*—Borderlines between chaetigers 8 to 13 indistinct. Chaetigers lon-

ger than wide. Neuropodial chaetae resemble those in the anterior and posterior regions, and notopodial chaetae are capillaries with minute imbrications. These chaetae are shorter than in the anterior region and only up to four in number. From chaetiger 8 onwards two rows of neuropodial uncini on both sides. Anterior row comprising 3 to 6 on chaetiger 8, increasing in number up to 12 in the following chaetigers. Posterior row with 7 to 15 uncini in the mature specimen. Each uncinus with a rostrum and two rows of distinct teeth (=capitium in the terminology of Holthe 1986), several additional small teeth laterally and between the larger teeth, visible only by SEM. Additionally some hair-like projections emerging from the lateral side of the uncini cover the tip of the rostrum (Figs. 3F, 4D).

*Posterior region.*—From chaetiger 14 backwards. Number of notopodial chaetae

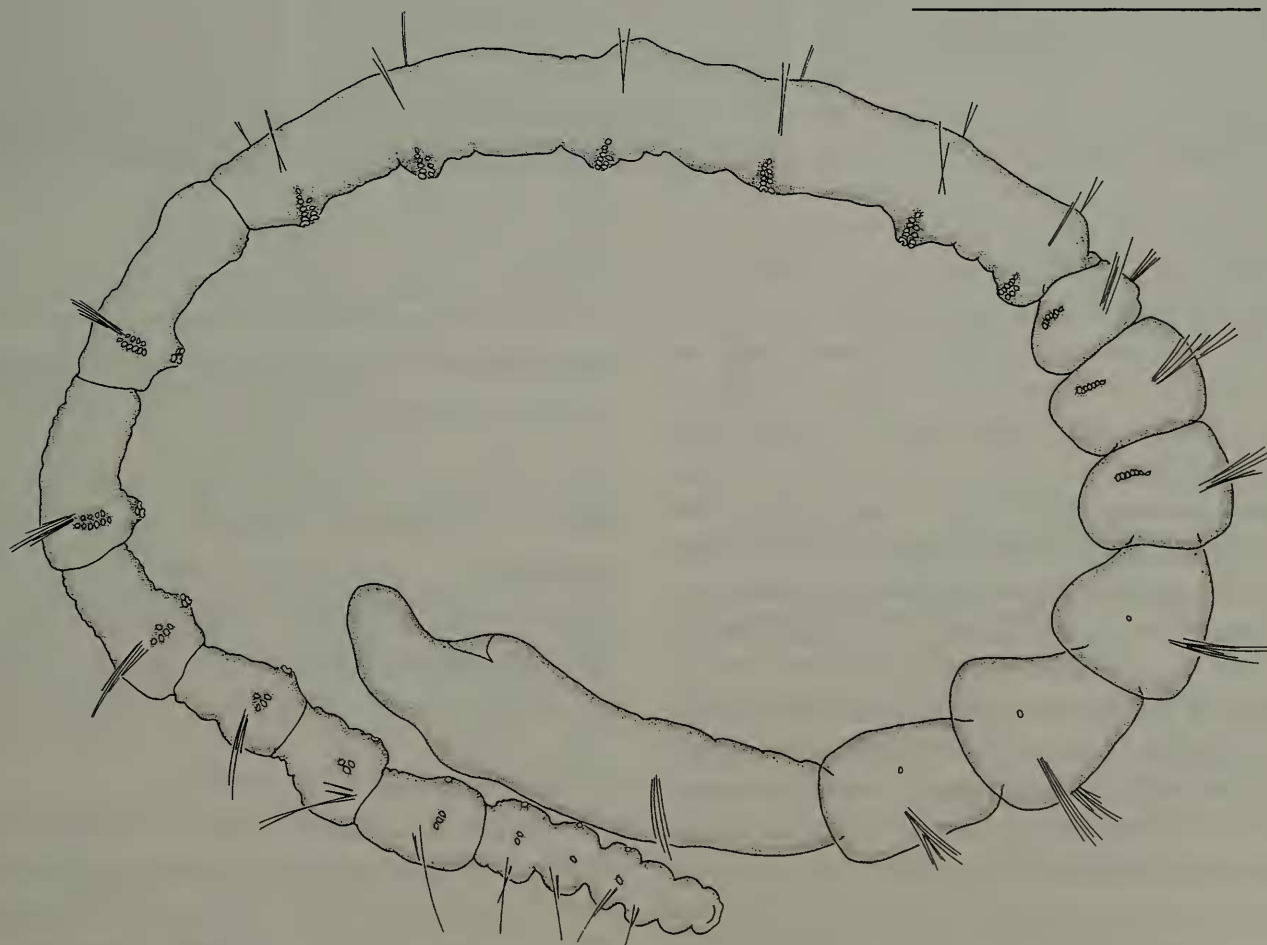


Fig. 2. *Boguea panwaensis*, new species. Paratype. Immature, lateral view. Scale bar = 0.5 mm.



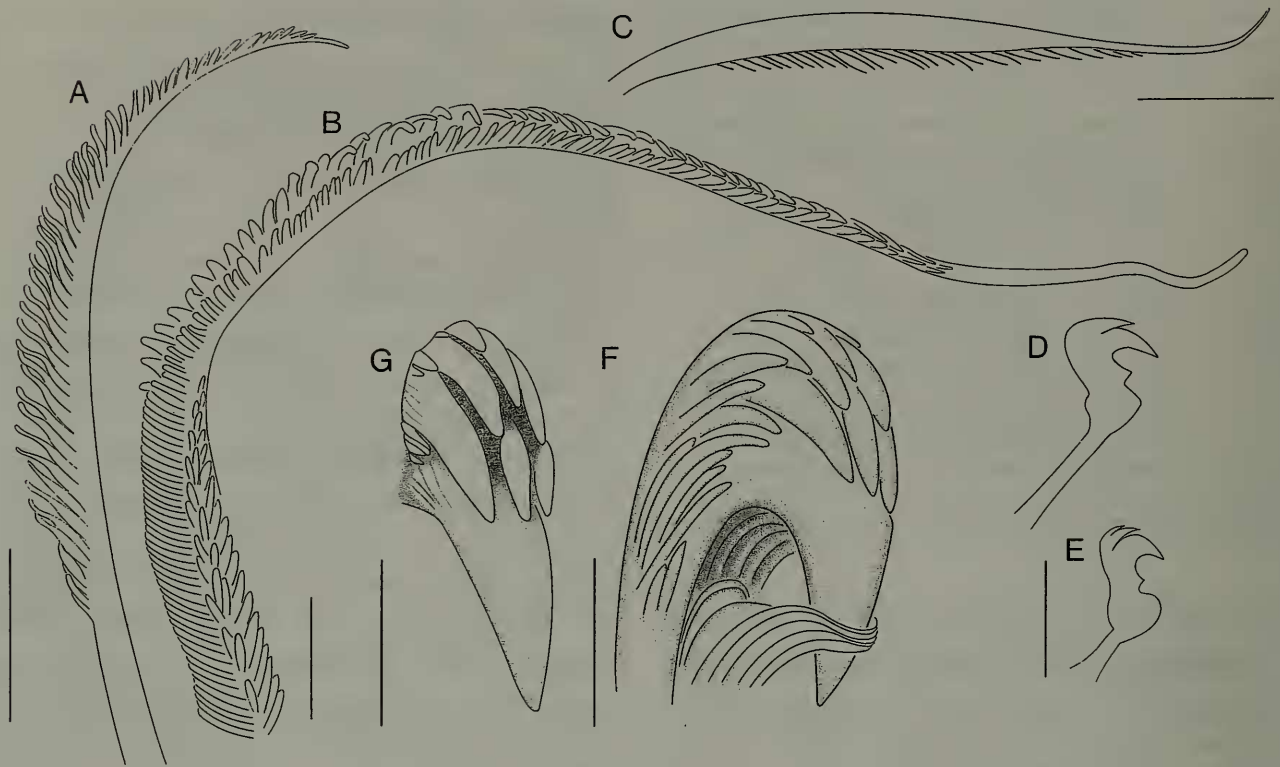


Fig. 3. A–F *Boguea panwaensis*, new species. A, Serrated capillary chaeta from chaetiger 15 with slender, curved imbrication. Scale bar = 5  $\mu\text{m}$ . B, Capillary chaeta from chaetiger 16 with triangular imbrications in the middle region. Scale bar = 5  $\mu\text{m}$ . C, Slightly curved, flattened serrate chaetae from chaetiger 14. Scale bar = 10  $\mu\text{m}$ . D, Juvenile rostrate uncinus from chaetiger 4 (D and E from paratype). E, Juvenile rostrate uncinus from chaetiger 2. Scale bar in D and E = 10  $\mu\text{m}$ . F, Uncinus from chaetiger 15. Scale bar = 2  $\mu\text{m}$ . G, *Boguea enigmatica* Hartman, 1945. Paratype, uncinus from chaetiger 5. Scale bar = 2  $\mu\text{m}$ .

first increasing up to 10, then decreasing in the posteriormost chaetigers, last two segments achaetous. Some of the imbricated capillary chaetae on chaetiger 14 to 17 possessing a specific structure not present in those of the anterior and middle region: in light microscopy these chaetae appear featherlike in lateral view with a series of fine pinnulated imbrications. From SEM preparations, pinnules from one type of chaetae revealed to be cylindrical in the proximal part of the chaetae; distally they are arranged in pairs, gradually forming triangular structures (Figs. 3B, 4E). The imbrications project dorsally from the ventral sides of the chaetal axes. The two rows of imbrications are covered on the ventral side with a series of additional forward directed imbrications, which build a characteristic keel (Fig. 4B). On chaetiger 14 to 17 another type of capillary chaetae with single rows of slender, slightly curved pinnules on each side exist (Figs. 3A, 4C). These pin-

nules are bent forward on the ventral side of the chaetae and directed dorsally. They differ from the chaetae with the triangular imbrications in that the appendages of these chaetae are longer and remain separated up to the distal end of the chaetae. There are also some curved, flattened serrated chaetae on these chaetigers (Fig. 3C; see also Wolf 1983, fig. 1i). In the following segments, from chaetiger 18 on, they are replaced by smooth and shorter capillary ones. From chaetiger 18 backwards relatively small spines occur, gradually decreasing in number; they are present even on one or two of the posteriormost segments, which bear no other chaetae. These spines resemble those of chaetiger 3, but are smaller.

Number of uncini reduced to approximately 8 in each row in chaetiger 14, decreasing gradually in number to chaetiger 23, with the 2 rows merging towards the posterior end of the body. Uncini in the last

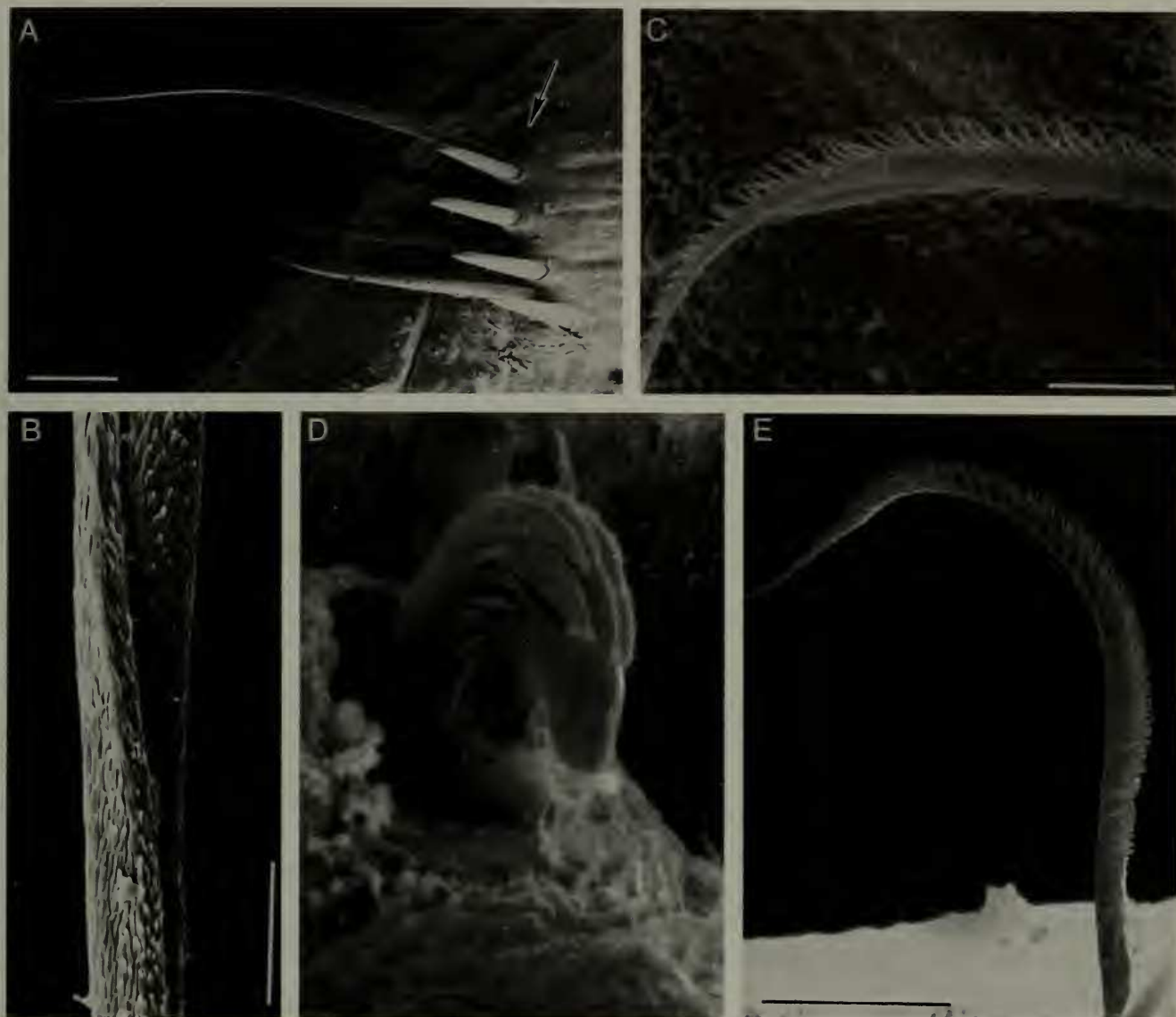


Fig. 4. *Boguea panwaensis*, new species. A, Spines and serrated capillary chaeta from chaetiger 3, arrow points to a broken-off additional capillary chaeta. Scale bar = 20  $\mu\text{m}$ . B, Serrated capillary chaeta with view on the ventral edge formed of imbrications on ventral side. Scale bar = 5  $\mu\text{m}$ . C, Capillary chaeta from chaetiger 15 with slender, curved imbrications. Scale bar = 5  $\mu\text{m}$ . D, Uncinus from chaetiger 15 with several additional teeth on the lateral side. Scale bar = 2  $\mu\text{m}$ . E, Chaeta from chaetiger 16 with triangular imbrications in the distal region. Scale bar = 5  $\mu\text{m}$ .

segments of the juvenile specimen small and rostrate.

Pygidium without appendages, anus terminal. In mature animals eggs of light brownish colour can be seen from the middle region to the posterior chaetiger (Fig. 1).

*Discussion.*—The new boguein species was discovered at Phuket, Thailand. The two other described species (*Boguea enigmatica* Hartman, 1945; *Boguella ornata* Hartman & Fauchald, 1971) were recorded only from Northeast America. To our

knowledge this is the first species found outside this region, with the exception of another undescribed species at the coast of Mauritania, probably belonging to *Boguella* (Dr. H. Michaelis, pers. comm.).

The new species from Thailand belongs to the genus *Boguea*. It shares the following characters with *B. enigmatica*: The body is divided into three regions. Distribution and types of chaetae are almost identical. A distinct borderline between peristomium and first chaetiger is not distinguishable, although Wolf (1983) mentioned slight lateral

indentations. The chaetae on the anterior chaetigers show the same minute distally rounded imbrications. The first segment that bears a single row of uncini is the fifth chaetiger. Both species of *Bogoea* possess posterior notopodial spines and small rostrate uncini.

The most characteristic difference of *Bogoea panwaensis* is the double row of uncini starting on chaetiger 8, whereas *B. enigmatica* has double rows from chaetiger 9 backwards. In addition, on the third chaetiger of the new species four capillary chaetae and four spines exist, which were not described for *B. enigmatica*. Four to six acicular spines are also mentioned by Wolf (1984) in his description of *Bogoea* sp. A from the Gulf of Mexico, however, his drawings differ from the structures observed by light microscopy in the specimens from Thailand. The length of the acicular spines in *B. panwaensis* is approximately the same, whereas *Bogoea* sp. A (Wolf 1984) show spines of varying length. These characteristic spines occur in the holotype and in the incomplete specimen of the present material, but are missing in the immature specimen.

The specific structures of the capillary chaetae in the species from Thailand at first—when compared with the drawings of the corresponding chaetae published by Wolf (1983)—seemed clearly to differentiate it from *B. enigmatica*. However, examination of a paratype of the latter species by SEM made clear that these differences derive largely from the lower resolution achievable with light microscopy; the structure of the chaetae is fundamentally the same in the two species. Certain differences in detail nevertheless did appear in this SEM comparison: serrated capilleries with paired and triangular imbrications (Figs. 3B, 4E) could not be found in *B. enigmatica*. The uncini show a similar arrangement of teeth in both species, with additional small teeth between the larger teeth on the lateral side. In the area under the rostrum, several smaller teeth are also present, but

they are much more numerous in *B. panwaensis* (Figs. 3F, 4D) than in *B. enigmatica* (Fig. 3G). The hair-like projections are only found on *B. panwaensis*. The small rostrate uncini are quite similar in both species.

#### Acknowledgments

We are especially grateful to Mr. Somsak Chullasorn and Mr. Anuwat Nateewathana, Phuket Marine Biological Center for their hospitality and allowing us to use their facilities. We would like to thank Dr. Mary Petersen and Dr. Danny Eibye-Jacobsen from the Zoologisk Museum, University of Copenhagen, for making available specimens of *Bogoea enigmatica* (extracted from: ZMUC-POL-541; Bogue Sound, North Carolina 6 Aug. 1962). We are grateful to Monika C. Müller for her help in preparing the SEM pictures, Dr. Deborah Dexter, San Diego, for her kind guidance of one of us (C. Meyer) to the sampling sites at the beaches of Phuket, two Thai students and Claire Bradshaw and Jason Shephard from Edinburgh for providing diving-samples from the Cape Panwa Bay. We are deeply obliged to Prof. Dr. Nathan W. Riser, Nahant, for going through the English text.

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